Course Type	Course Code	Name of the Course	L	T	P	Credits
DC3	NMNC511	Remote Sensing and Digital Image Processing	3	1	0	4

Objective: The proposed course provides basic understanding about digital image processing of Remote Sensing datasets / images acquired by different earth resources satellites. Presently, remote sensing datasets available from various earth orbiting satellites are being used extensively in various domains. The above course will improve understanding about overall remote sensing data processing.

Learning outcomes: Students will learn the principles of remote sensing and digital image processing, Techniques of visual and digital image analysis, data reception and data products, physical basis of signature, radiometry, platforms, characteristics of satellite based remote sensing system, applications of satellite based remote sensing.

Unit No.	Topics to be covered	Lecture Hours + Tutorials	Learning Outcomes
I	Introduction to Remote Sensing System, Historic perspective, electromagnetic radiation, sources of EM radiation for remote sensing. Interaction of EMR with atmosphere, atmospheric windows, interacting EM Radiation with earth's surface, spectral signature	6L+0T	Students will be able to understand the introduction part of remote sensing and interaction of EMR with earth system
II	Fundamentals of radiometry, surface characteristics for radiometric measurement, physical basis of signatures. Remote Sensors and platforms, classification of remote sensors, spatial, spectral, radiometric and temporal resolution.	7L+0T	Students will be able to understand the radiometry and physical basis of signature and characteristics of remote sensors and platform
III	Characteristics of optical, infrared and microwave sensors and their data products	6+0T	Students will be able to characterize the different remote sensors in detail along with their data products
IV	Application of remote sensing to various engineering areas.	3+0T	Students will be able to understand the different applications of remote sensor
V	Visual image analysis and image interpretation, pre-processing of images. Digital Image Processing System: Components, data formats, The Histogram and Its Significance to Digital Image Processing of Remote Sensor Data and Univariate Descriptive Image Statistics, Multivariate Image Statistics	6+0T	Students will be able to analyse the image visually and process and analyse the image digitally
VI	Image Pre-processing: Radiometric and Geometric Correction Radiometric and Geometric errors and Corrections, Correction for Sensor System, Correction for environmental attenuation error; Image-to-Map Geometric rectification implementation	4L+5T	Students will be able to understand the different corrections applied in the image to improve its the quality

VII	Image Enhancement: Image Reduction and Magnification, Contrast Enhancement, Band Ratioing, Spatial Filtering to Enhance Low- and High-Frequency Detail and Edges, Special Transformations, Principal Components Analysis.	4L+5T	Students will know the techniques for image quality improvement further to interpret the image in better way
VIII	Image Classification: Supervised Classification, Unsupervised Classification, Fuzzy Classification, Statistical algorithms, Classification Map Accuracy Assessment	6L+4T	Students will be able to understand the different digital image classification methods
	Total:	**42L+14T (56)**	

Text Books

1. George Joseph (2005), Fundamentals of Remote Sensing
2. John A. Richards (2012), Remote Sensing and Digital Image Analysis

Reference Books

1. Thomas L., Ralph W. Kiefer, and Jonathan C. (2015), Remote Sensing and Image Interpretation.